CLAIMS

1. A device for determining labeled data stream switchpath(s) in a label switched communication network comprising a multiplicity of label switched routers (LSR), each stream being associated with a chosen forwarding equivalence class and with a chosen set of service data, which device is characterized in that it includes:
   - memory means (Mn) adapted to store a table (Tn1) of correspondences between sets of service data and information data representative of at least two chosen criteria and a descriptive structure (Tn2) containing information data representative of a state of utilization and of a topology of the network, and
   - processing means (P) adapted:

   a) to receive a path set-up request containing a set of service data associated with a stream to be switched, for determining in said table (Tn1) at least two criteria stored in corresponding relationship to said set of service data associated with the stream,

   b) to ensure the connectivity of said multiplicity of nodes, on the basis of information data stored in said descriptive structure (Tn2),

   c) to calculate from among said nodes (LSR) possible paths (r*) between a departure node (LER1) and a destination node (LER2) taking account of at least one of said two criteria that have been determined and then to deduce an ideal solution (Z(я)) from performances (Z(r*)) of said possible paths (r*) on at least one of said criteria,

   d) to assign each possible path (r*) an interest value (U(r)) taking account of said ideal solution (Z(я)) and then classify said possible paths taking account of their respective interest values, and

   e) to select a path from among said classified possible paths and then associate with said stream to be switched a label representative of said selected path so that said labeled stream is switched via said path to the destination node (LER2).

2. A device according to claim 1, characterized in that said processing means (P) are adapted to work on the basis of sets of service data stored in said table (Tn1) and representative of a type of service and/or a quality of service.

3. A device according to claim 1, characterized in that some of said information data associated with a set of service data being representative of at least one local constraint, said processing means (Pn) are adapted to determine from among said multiplicity of nodes (LSR) all of the pairs of nodes that can set up between them an

oriented connection supporting each local constraint stored in corresponding relationship to a set of service data associated with said stream to be switched and then to ensure the connectivity of all of the nodes of said pairs.

4. A device according to claim 1, characterized in that some of said information data, associated with a set of service data, being representative of at least one global constraint, said processing means (Pn) are adapted to retain from among said possible paths (r*) those that satisfy each global constraint stored in corresponding relationship to a set of service data associated with said stream to be switched, so as to assign interest values (U(r)) only to said retained possible paths (r*).

5. A device according to claim 1, characterized in that at least one of said criteria is of the nonadditive type.

6. A device according to claim 5, characterized in that said processing means (Pn) are adapted, when calculating possible paths (r*) and deducing said ideal solution (Z(я)), to integrate a trace storing a route corresponding to a partial path, so as to detect and prevent the occurrence of cycles in the paths under construction.

7. A device according to claim 6, characterized in that said processing means (Pn) are adapted to retain solutions that are "weakly nondominated" on each nonadditive criterion determined, during the procedure of eliminating said partial paths.

8. A device according to claim 1, characterized in that said processing means (Pn) are adapted to verify said connectivity by applying a mechanism of propagation from the departure node (LER1) to all the other nodes (LSR) of said multiplicity of nodes, so that each node (LSR) is visited.

9. A device according to claim 1, characterized in that said processing means (Pn) are adapted to determine for each path values representative of its "performance" (Z(r)) relative to each criteria determined and to qualify a path (r) for which said performance values (Z(r)) are "nondominated" as a possible path (r*).

10. A device according to claim 9, characterized in that said processing means (Pn) are adapted to determine for each criterion determined the best performance value (Z*(r)) observed over said possible paths, referred to as the "optimum value", and then to construct said ideal solution (Z(я)) in the form of a multiple of components consisting of the various optimum values determined.

11. A device according to claim 10, characterized in that said processing means (Pn) are adapted to assign an interest value (U(r)) to each possible path (r) when it characterizes the greatest value of the components, associated with the various criteria determined, of a weighted Tchebychev function, as a function of differences

between the performance of said possible path (r*) and the corresponding optimum value of said ideal solution (Z(я)).

12. A device according to claim 11, characterized in that said processing means (Pn) are adapted to preselect k possible paths having the k lowest interest values (U(r)) and then to select a path from the k preselected paths.

13. A device according to claim 12, characterized in that said processing means (Pn) are adapted to calculate bidirectional paths.

14. A device according to claim 12, characterized in that said processing means (Pn) are adapted to select from said k paths at least one other path dedicated to connection restoration.

15. A device according to claim 3, characterized in that said local and/or global constraints determined belong to a group comprising at least the minimum bandwidth required, the maximum length of the path, the maximum duration of the path, a set of prohibited or mandatory connections, the maximum and/or minimum number of hops on the path, one or more mandatory nodes, one or more prohibited nodes, at least one authorized class of service, a set of path colors, a wavelength division multiplexing capacity, a concatenation capacity, an assignment capacity, and a protection capacity.

16. A device according to claim 1, characterized in that said criteria belong to a group comprising at least the available bandwidth (C2), the number of hops on the path (C3), the duration of the path (C1), a wavelength division multiplexing capacity, a concatenation capacity, an assignment capacity, and a protection capacity.

17. A device according to claim 16, characterized in that said criteria comprise the available bandwidth (C2) and the duration of the path (C1).

18. A device according to claim 17, characterized in that said processing means (Pn) are adapted to impact said criterion applying to the duration of the path (C1) by a penalty.

19. A device according to claim 18, characterized in that said penalty applies to the administration cost (CA) of the path.

20. A device according to claim 1, characterized in that said correspondence table (Tn1) comprises weighting factors associated with at least some of said criteria as a function of their importance.

21. A label edge router (LER) for a label switched communication network, characterized in that it comprises a device according to any one of claims 1 to 20.